



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,190	04/22/2004	Kangwook Park	SEC.1102	5940
20987	7590	12/28/2005	EXAMINER	
VOLENTINE FRANCOS, & WHITT PLLC			HO, TU TU V	
ONE FREEDOM SQUARE			ART UNIT	
11951 FREEDOM DRIVE SUITE 1260			PAPER NUMBER	
RESTON, VA 20190			2818	

DATE MAILED: 12/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/829,190

Applicant(s)

PARK, KANGWOOK

Examiner

Tu-Tu Ho

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 3,9,11-13,21-26,28 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8,10,14-20,27 and 29 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Oath/Declaration

1. The oath/declaration filed on 04/22/2004 is acceptable.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Election/ Restriction

3. Applicant's election with partial traverse of Species I, claims 1-2, 4-8, 10, 14-20, 27, and 29-30, in the reply filed on 12/05/2005 is acknowledged. The traversal is on the ground(s) that (a) Figs. 4 and 5 constitute mutually exclusive and distinct species from Figs. 2 and 3A-3F; and (b) claims 1-2, 4-8, 14-20, 27, and 29-30 are generic to species I-IV. This is not found persuasive because (a) claims to mutually exclusive and distinct species do not render the restriction requirement between species improper; and (b) no claim is generic because, according to MPEP 806.04(d) [R-3], "a generic claim should *require< no material element additional to those **>required by< the species claims, and ** each of the species >claims must require all the limitations of the generic claim"; specifically, as an example, non-elected species claim 21 does not include the limitation "at least a portion of the emitter electrode which is in contact with the emitter region has a single crystalline structure" (emphasis added) as required by claim 1, thus non-elected species claim 21 does not require all the limitations of a generic claim as required by

MPEP 806.04(d) [R-3], rendering claim 1 non-generic; and non-elected species claim 3 does not include the limitation “an emitter electrode comprising an epitaxially grown layer of the first conductivity type contacting the emitter region” (emphasis added) as required by claim 17, thus non-elected species claim 3 does not require all the limitations of a generic claim as required by MPEP 806.04(d) [R-3], rendering claim 17 non-generic.

Furthermore, because claim 30 depends on non-elected claim 21, claim 30 is also being withdrawn from consideration.

The requirement is still deemed proper and is therefore made FINAL.

4. Claims 3, 9, 11-13, 21-26, 28, and 30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely partially traversed the restriction (election) requirement in the reply filed on 12/05/2005, as noted above.

Claim Objections

5. Claim 5 is objected to because of the following informalities: Claim 5 recites: “at least of portion of” which contains a typographical error. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2818

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-2, 4-8, 10, 14, 16-17, 27, and 29** are rejected under 35 U.S.C. 102(b) as being anticipated by Nii et al. U.S. Patent Application Publication 20020149062 (the '062 reference).

The '062 reference discloses in Figs. 16-22 and 44-46 and respective portions of the specification a bipolar transistor as claimed.

Referring to **claim 17**, the reference discloses a bipolar transistor, comprising:

a substrate having a collector region (3, Figs. 16-22) of a first conductivity type (n, paragraph [0155]);

a base region (6) of a single crystalline structure and of a second conductivity type (p, paragraph [0156]) located over the collector region;

an emitter region (13) defined at least in part by impurities of the first conductivity type contained in the base layer (paragraph [0160]); and

an emitter electrode (12) comprising an epitaxially grown layer of the first conductivity type contacting the emitter region (paragraph [0160], particularly "silicon crystal doped with arsenic may also be epitaxially grown instead of polysilicon").

Referring to **claim 1**, the reference discloses a bipolar transistor, comprising:

a substrate having a collector region (not shown, Figs. 44-46, paragraph [0246]) of a first conductivity type;

a base layer (306) of a single crystalline structure and including impurities of a second conductivity type (p, paragraph [0244]) located over the collector region;

an emitter region (314) defined at least in part by impurities of the first conductivity type (n, paragraph [0245]) contained in the base layer; and

an emitter electrode (312 or 313) of the first conductivity type (paragraph [0245]) contacting the emitter region, wherein at least a portion of the emitter electrode which is in contact with the emitter region has a single crystalline structure (paragraphs [0243] to [0251], particularly paragraph [0251], “semiconductor device in the sixth embodiment is a bipolar transistor constructed such that the emitter electrode 312 composed of the polysilicon is replaced with an emitter electrode 313 composed of single crystal silicon in the bipolar transistor in the fifth embodiment shown in FIG. 45”).

Referring to **claim 2**, the reference further discloses a base electrode (no number, Fig. 46, “base lead-out” 7, Fig. 23, paragraphs [0156] and [0246])) located over the base region.

Referring to **claim 4**, the reference further discloses a metal layer (317/319a, paragraphs [0246] and [0249]) formed on the emitter electrode (312).

Referring to **claim 5**, the reference further discloses that at least a portion of the emitter electrode (313) in contact with the metal layer has a single crystalline structure (Fig. 46, paragraph [0251]).

Referring to **claim 6**, the reference further discloses a metal layer (26, paragraphs [0158] and [0246]) formed on the base layer.

Referring to **claim 7**, the reference further discloses a metal layer (26) formed on the base electrode (7).

Referring to **claim 8**, the reference further discloses that the metal layer is a silicide layer (317), and wherein the bipolar transistor further comprising a metal electrode layer (319a) contacting the silicide layer (paragraphs [0246] and [0249]).

Referring to **claim 10**, the reference further discloses that an entirety of the emitter electrode (313, paragraph [0251]) has a single crystalline structure.

Referring to **claim 14**, the reference further discloses that the emitter electrode 312 or 313 comprises Si (paragraph [0251]).

Referring to **claim 16**, the reference further discloses a sidewall spacer (not shown in Fig. 46, 10 in Fig. 23, no number in Fig. 26) which electrically insulates the emitter electrode from the base electrode.

Referring to **claim 27**, the reference further discloses an insulating layer (14, Fig. 23) formed on the substrate and having a through hole (generally defined by the emitter electrode 12 comprising an epitaxially grown layer) aligned over the emitter region (13), wherein the epitaxial layer is at least partially contained in the through hole.

Referring to **claim 29**, the reference further discloses that the epitaxially grown layer (12) comprises Si (paragraph [0160]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 15 and 18-20** are rejected under 35 U.S.C. §103(a) as being unpatentable over Nii et al. U.S. Patent Application Publication 20020149062 (the '062 reference).

Referring to **claim 15**, the reference discloses a bipolar transistor as claimed and as detailed above for claim 1, including the base layer and the collector region including a surface of the collector region. Although the reference does not further disclose a base region located in the surface of the collector region and below the base layer, adding a base region located in the surface of the collector region and below the base layer would have been obvious to one of ordinary skill in the art at the time the invention was made because Applicant has not described in the specification any advantage for adding the base region located in the surface of the collector region and below the base layer.

Referring to **claim 18**, the reference discloses a bipolar transistor as claimed and as detailed above for claim 17, including the epitaxially grown emitter electrode 12. Although the reference does not disclose that the epitaxially grown layer 12 was grown at a temperature of less than 900°C, the reference discloses that the other epitaxially grown layer (3,6) was grown at a temperature of less than 900°C (paragraph [0156]). Therefore it is either (a) the epitaxially grown layer 12 could be grown at a temperature of less than 900°C similar to epitaxially grown layer (3,6) because the reference does not disclose otherwise, or (b) there is no evidence that the epitaxially grown layer 12 is substantially different from that of the claimed invention, therefore such a change would have been obvious.

Referring to **claims 19-20**, the reference discloses in Figs. 44-46 a bipolar transistor as claimed and as detailed above for claim 1, including a silicide layer (317) formed on the emitter electrode (314), and a metal electrode layer (319a) formed on the silicide layer. The reference

further discloses broadly as claimed that a metal electrode layer (319a) formed on the emitter electrode (314). However, in the embodiment of Figs. 44-46, the reference does not disclose that the emitter electrode comprises an epitaxially grown layer as claimed. Nevertheless, in the embodiment of Figs. 16-22, the reference teaches that the emitter electrode can be formed epitaxially, as detailed above for claim 17. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the embodiment of Figs. 44-46 such that the emitter electrode formed or comprises an epitaxial layer. One would have been motivated to make such a change because the reference teaches that the emitter electrode can be formed epitaxially in the embodiment of Figs. 16-22 and because the reference does not disclose that the emitter electrode can not be formed epitaxially in the embodiment of Figs. 44-46.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2818

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Tu-Tu Ho
December 27, 2005